



GIFTLED

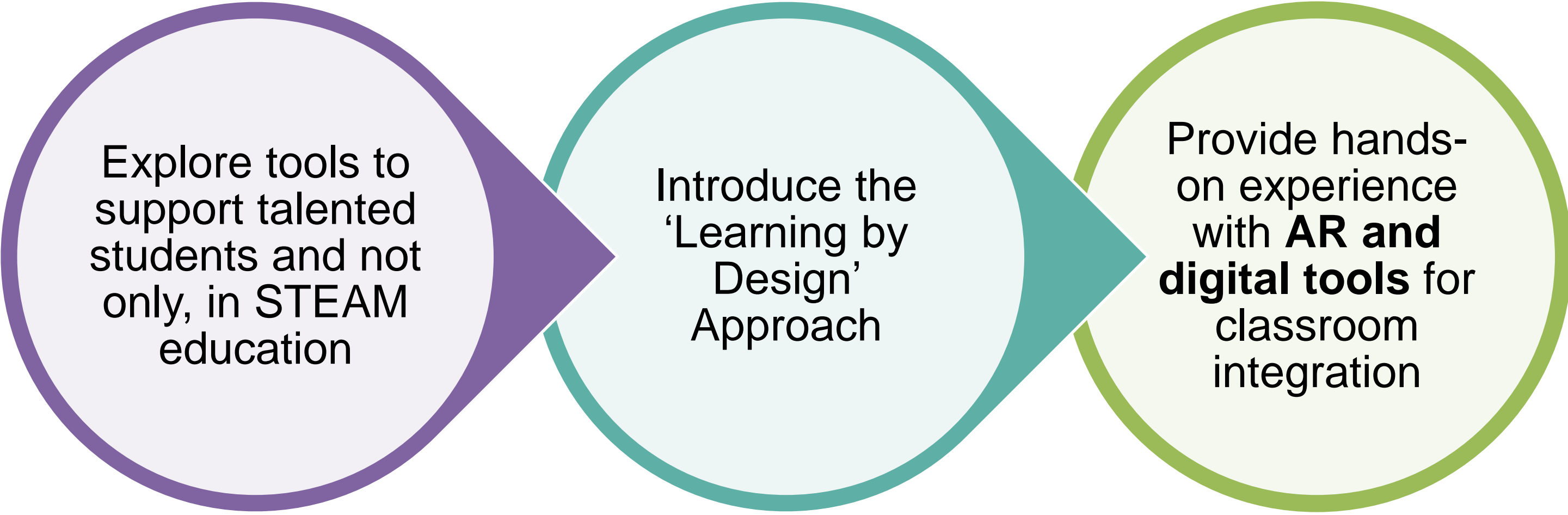
Digital and augmented reality applications in STEAM education

PROJECT N°:

2022-1-PL01-KA220-SCH-000087644

Xanthia Aristidou, PhD
Senior Researcher/Project Manager
CARDET

In today's workshop, we will:

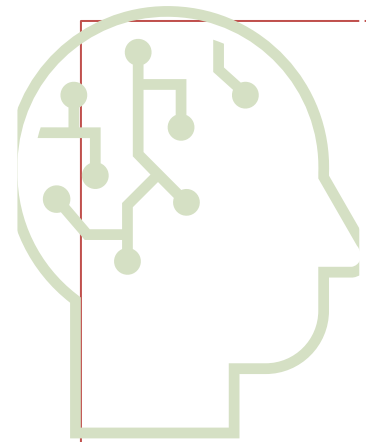


Explore tools to support talented students and not only, in STEAM education

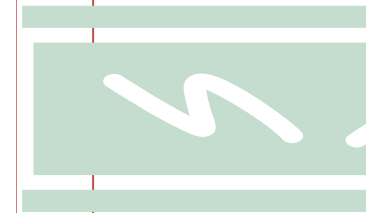
Introduce the 'Learning by Design' Approach

Provide hands-on experience with **AR and digital tools** for classroom integration

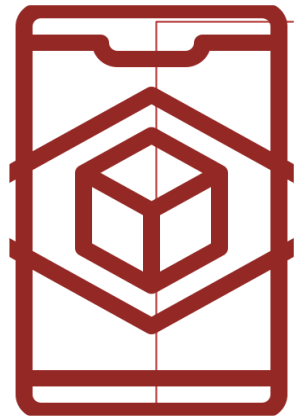
Structure of the workshop



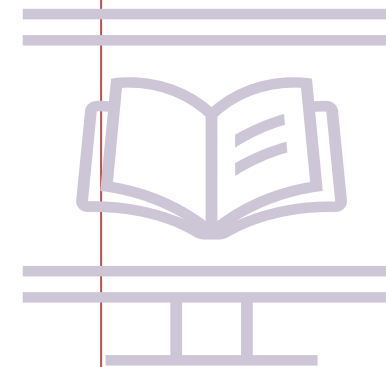
Insights into the Giftled Method



Introduce the 'Learning by Design'
Approach



Augmented Reality and STEAM
Education



Explore the tools of GIFTLED: AR case
studies, Handbook for Teachers, Toolkit
Instruction Videos, Curriculum

Let's meet!

Go to www.menti.com

Enter the code

54550843



STEAM education for gifted individuals

Gifted and talented individuals have the skills to go far in the fields of **science, technology, engineering, art and mathematics.**



However, nowadays there is still a lack of personalised education for this group, which unfortunately prevents them from developing their skills and knowledge to the fullest.

The idea

The idea for the GIFTLED project is to provide gifted individuals **learning opportunities** to increase their motivation and avoid the feelings of frustration and stagnation by offering them a pathway to realise their potential in STEAM.



The GIFTLED project

Develop **new methods and resources** for including gifted people in STEAM education.

- take into account their educational needs and talent development
- contribute to increased inclusion and diversity in specific educational fields



GIFTLED

Project duration: 01/12/2022 to 30/11/2024 (24 months)

Partners



Akademia
Humanistyczno
Ekonomiczna
w Łodzi



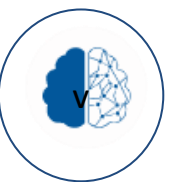



Driving Excellence & Innovation



GIFTLED

Objectives

-  Improve educational practices for gifted/talented students by training teachers in STEAM methods that address their specific needs. This will include creating an open digital platform with educational tools, activities, and augmented reality resources.
-  Support teachers with practical materials, such as a digital handbook, AR case brochure, videos, and curriculum.
-  Help gifted/talented students by using the GIFTLED methodology, allowing them to work with digital and augmented reality tools to create learning products.
-  Encourage change in gifted/talented education through project activities where teachers and students share their experiences with others from different organizations and countries.



Results of the project



A Handbook for teachers

Augmented Reality case package for
gifted/talented individuals

Toolkit Introduction Video package for
teachers and gifted/talented
individuals

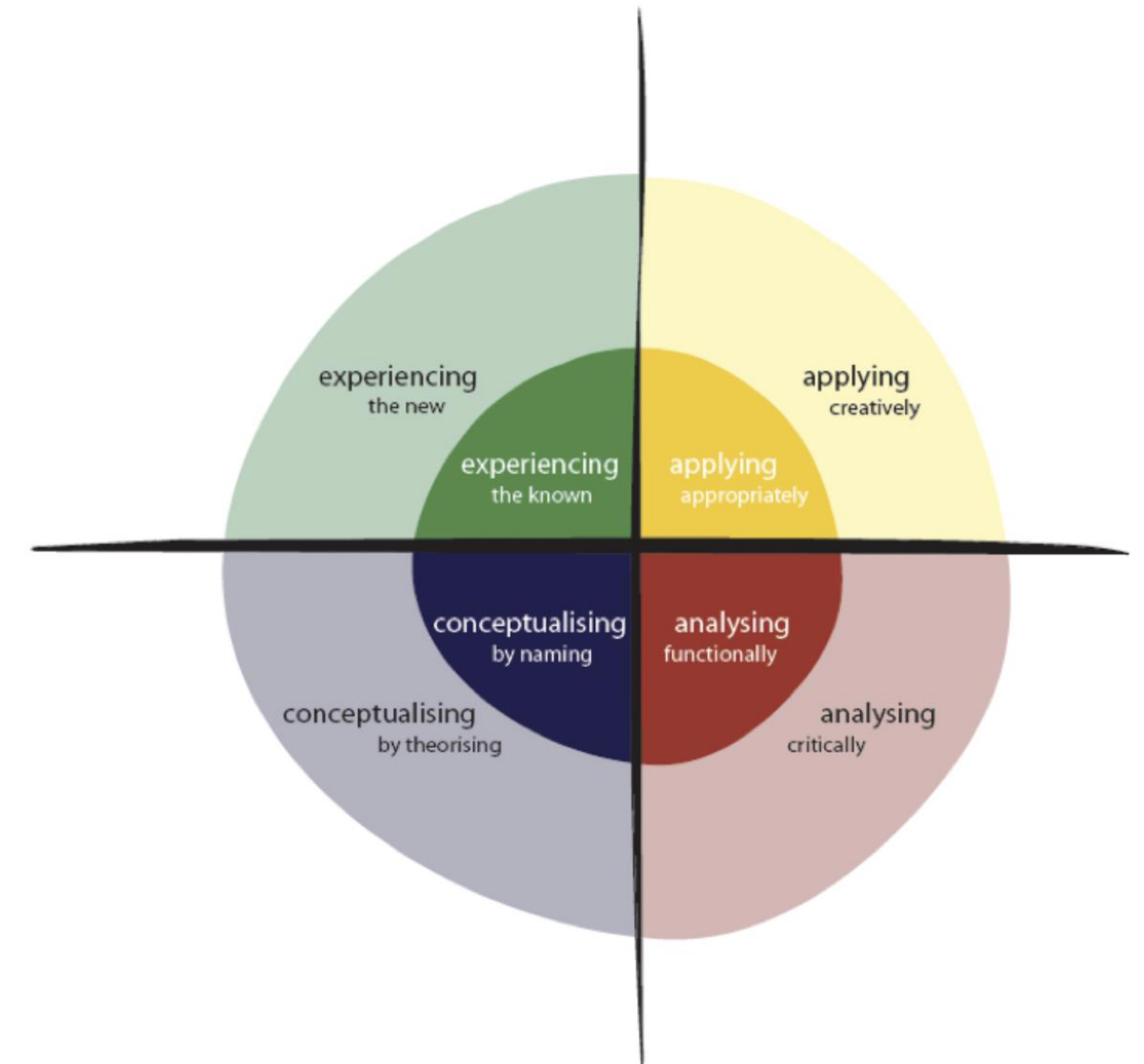
The GiftLed Curriculum for teachers

An Open Digital Platform

Why is the project relevant today?

The 'Learning by Design' Approach

- Provides gifted students the chance to engage in creative educational activities.
- Helps them transform subject knowledge into **innovative educational products**.
- **Two Key Benefits:**
 - Offers **challenging and enjoyable learning tasks** that stimulate critical thinking.
 - Enables students to improve their **natural abilities** by designing products that reflect their talents.



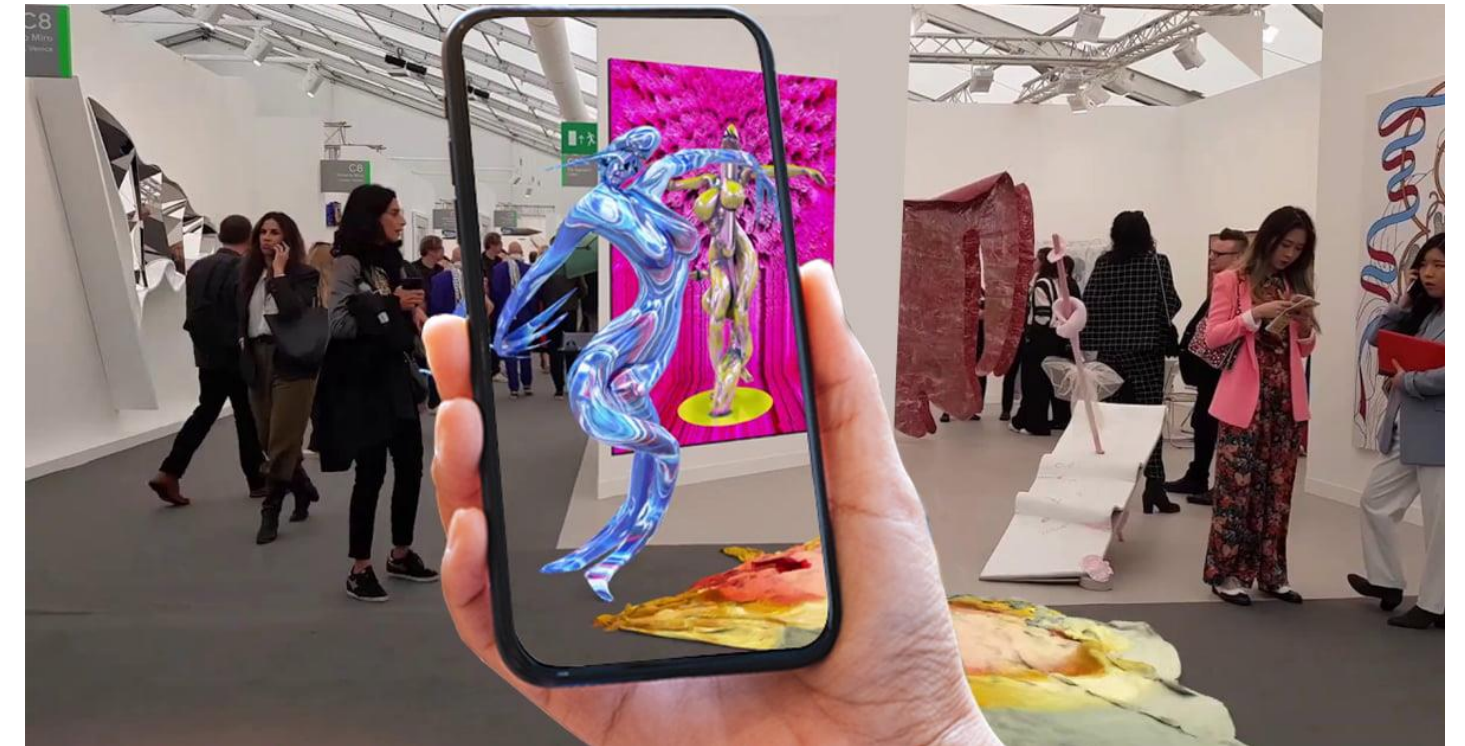
“Learning by design” methodology

Student-centered Learning: Encourages students to take ownership of their learning through the creation of meaningful projects.

Creative process: Transforms **subject knowledge** into **practical, creative outputs**.

Challenging tasks: Students engage in complex, real-world problems that foster **critical thinking** and **problem-solving**

Example: In an **art and technology class**, students design a **virtual gallery** using digital design tools. They curate their own artwork and create an interactive gallery experience in augmented reality, allowing them to blend **artistic expression** with **technical skills**.



Source: <https://www.plugin.com/augmented-reality/creates-opportunities-ar-art/>

CARDET: “Learning by Design and the SpriteLab tool”



Co-funded by the
Erasmus+ Programme
of the European Union

Η προσέγγιση της Μάθησης μέσω
Σχεδιασμού και το ψηφιακό
εργαλείο σχεδιασμού SpriteLab

PROJECT N°:
2022-1-PL01-KA220-SCH-000087644

Maria Elia

by supporting the development of critical thinking, creativity and problem-solving skills.

CARDET_Learning by Design and the SpriteLab tool

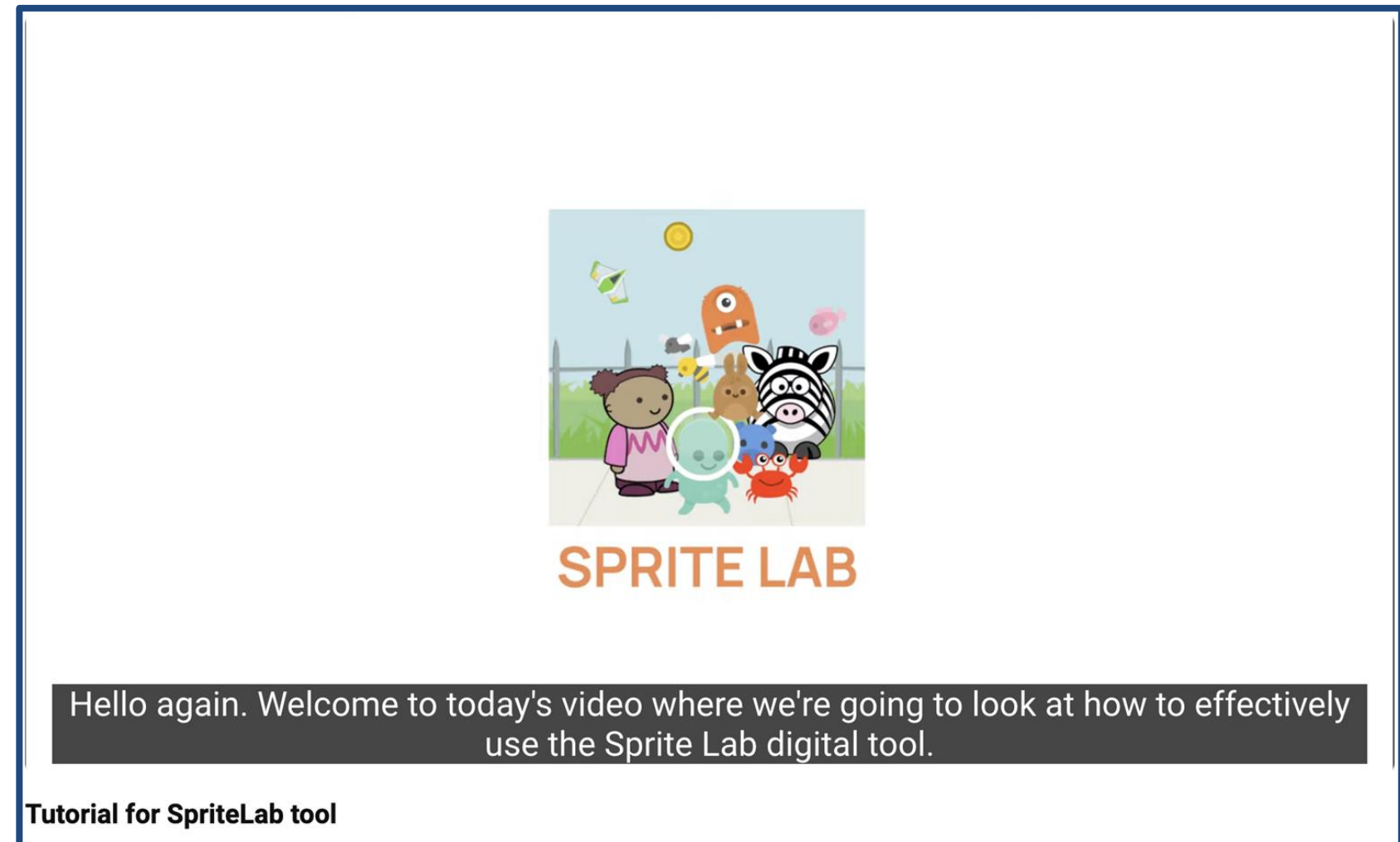
This video explains the benefits of the **Learning by Design Approach** for educating gifted students in STEAM education while discussing the benefits of the **SpriteLab tool** for enriching the learning experience.

[Link 1](#)

CARDET: “Learning by Design and the SpriteLab tool”

This video explains **how to create a project** from the beginning using the **Sprite Lab tool**.

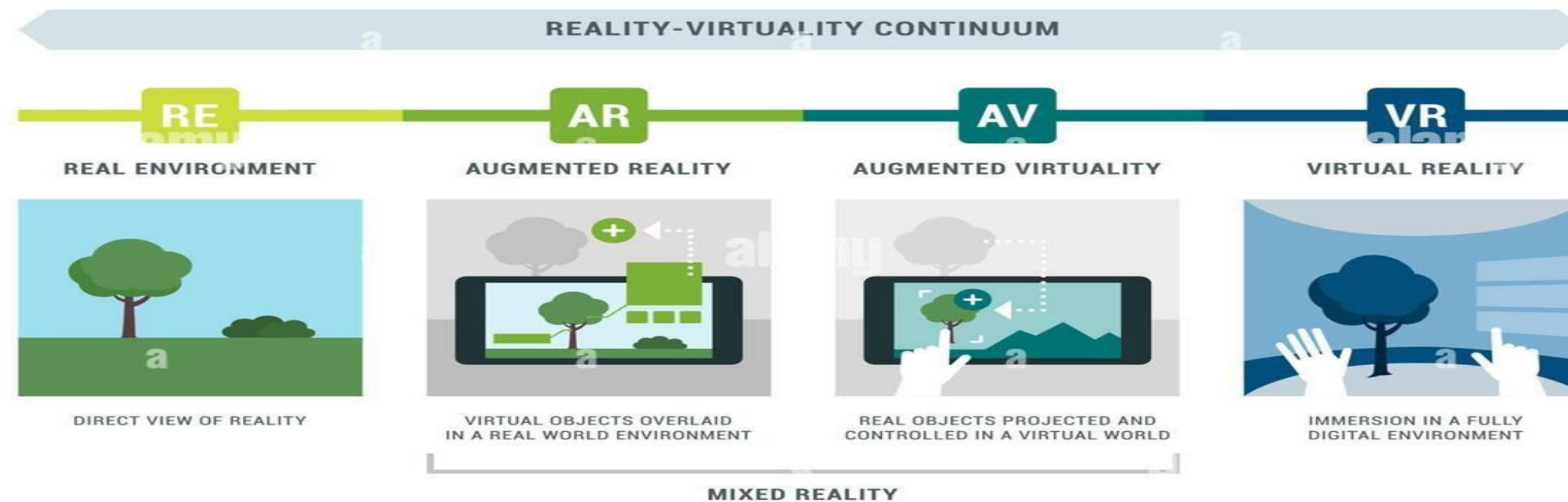
In this video, we create a game that involves multiples of 5. A little fish collects coins that are multiples of 5, and these are collected in a basket. However, we have to be careful, because there are coins that are not multiples of 5, as well as additional obstacles.



[Link 2](#)

Augmented Reality (AR)

- Augmented Reality allows people to combine reality and digital information (Berryman, 2012)



The use of Augmented Reality to enhance learning experiences

Allow computer-generated virtual images to be added to a live, real-world environment in real time (Zhou et al., 2008)

Increasing motivation and participation

Numerous design opportunities where students can creatively produce their own learning products.



<https://www.forbes.com/sites/forbestechcouncil/2021/12/10/the-state-of-augmented-reality/>

Examples of AR applications in different areas of STEAM (GIFTLED, 2023)

Science

Interactive 3D models of scientific phenomena, such as the solar system, the human body

Virtual experiments



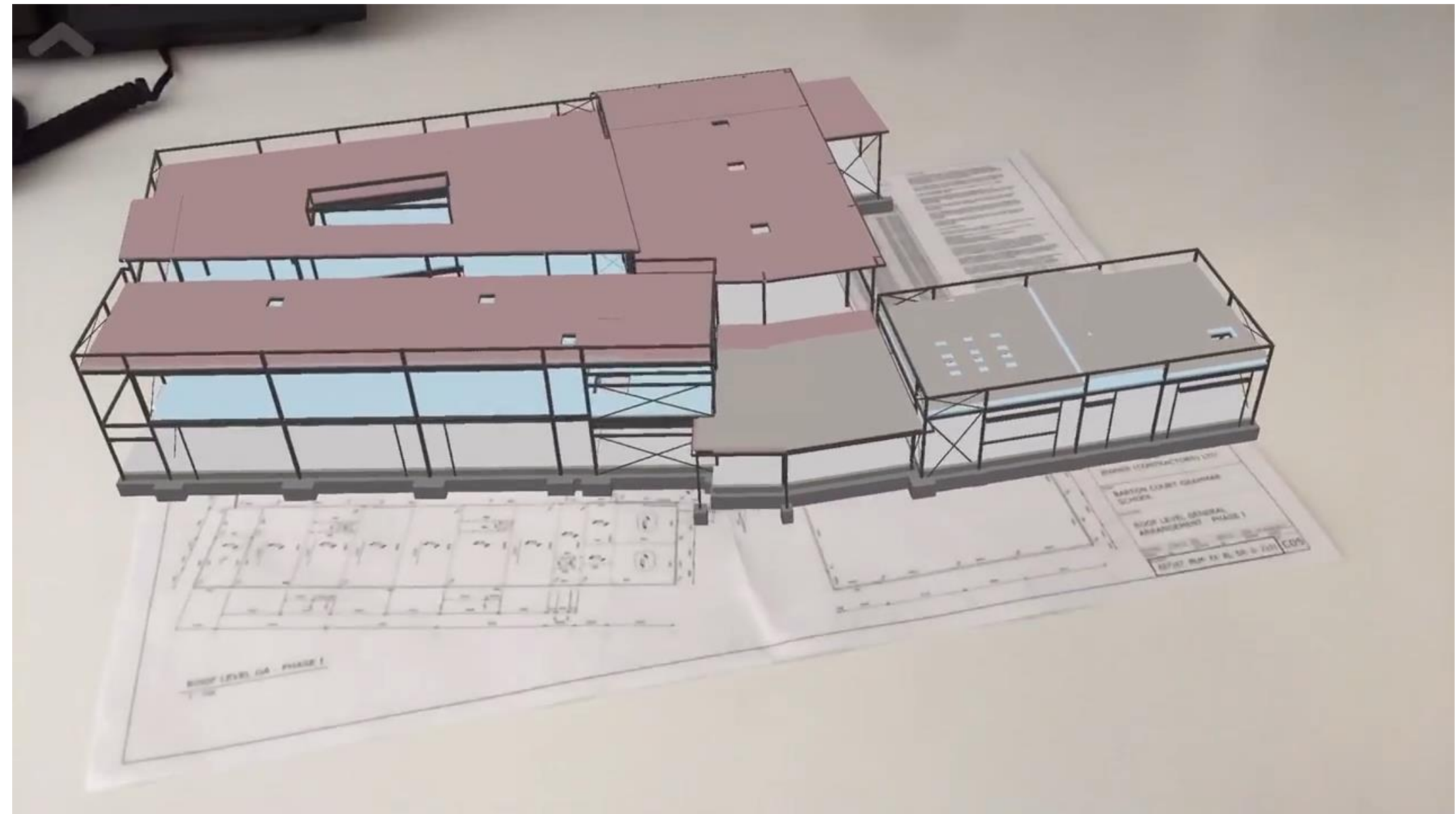
<https://www.space.com/41001-astroreality-solar-system-mini-ar-models.html>

Examples of AR applications in different areas of STEAM (GIFTLED, 2023)

Engineering

Simulation of engineering drawings

Educational games using the AR



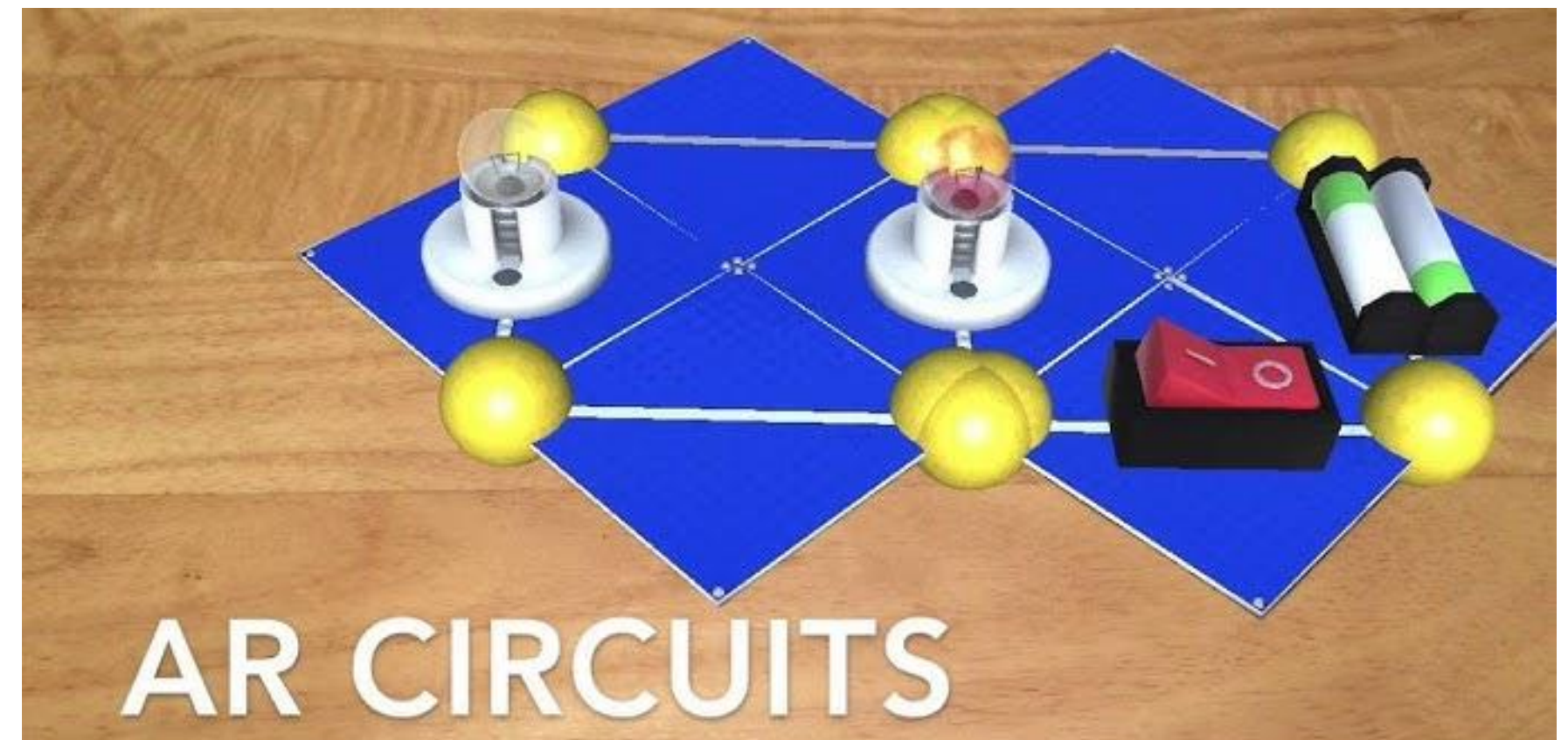
<https://arpost.co/2019/05/08/how-augmented-reality-is-transforming-the-construction-industry/>

Examples of AR applications in different areas of STEAM (GIFTLED, 2023)

Technology

Circuit Simulation & Design

Robotics & Engineering AR
Simulations



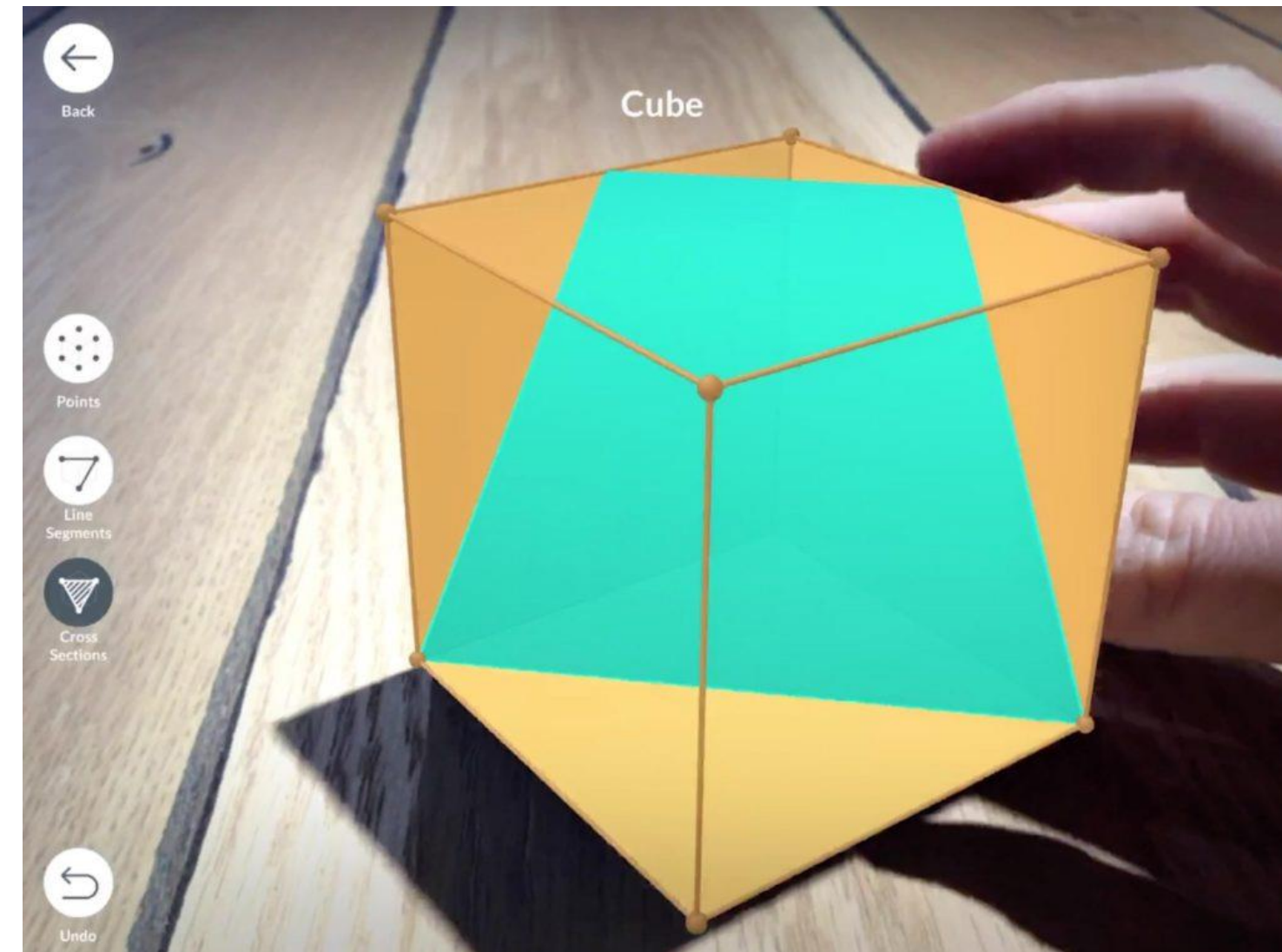
<https://www.youtube.com/watch?v=OBPF-rG3ICY>

Examples of AR applications in different areas of STEAM (GIFTLED, 2023)

Mathematics

Interactive 3D models of geometric shapes

Visualisation of mathematical concepts



<https://classtechtips.com/2018/10/30/augmented-reality-geometry/>

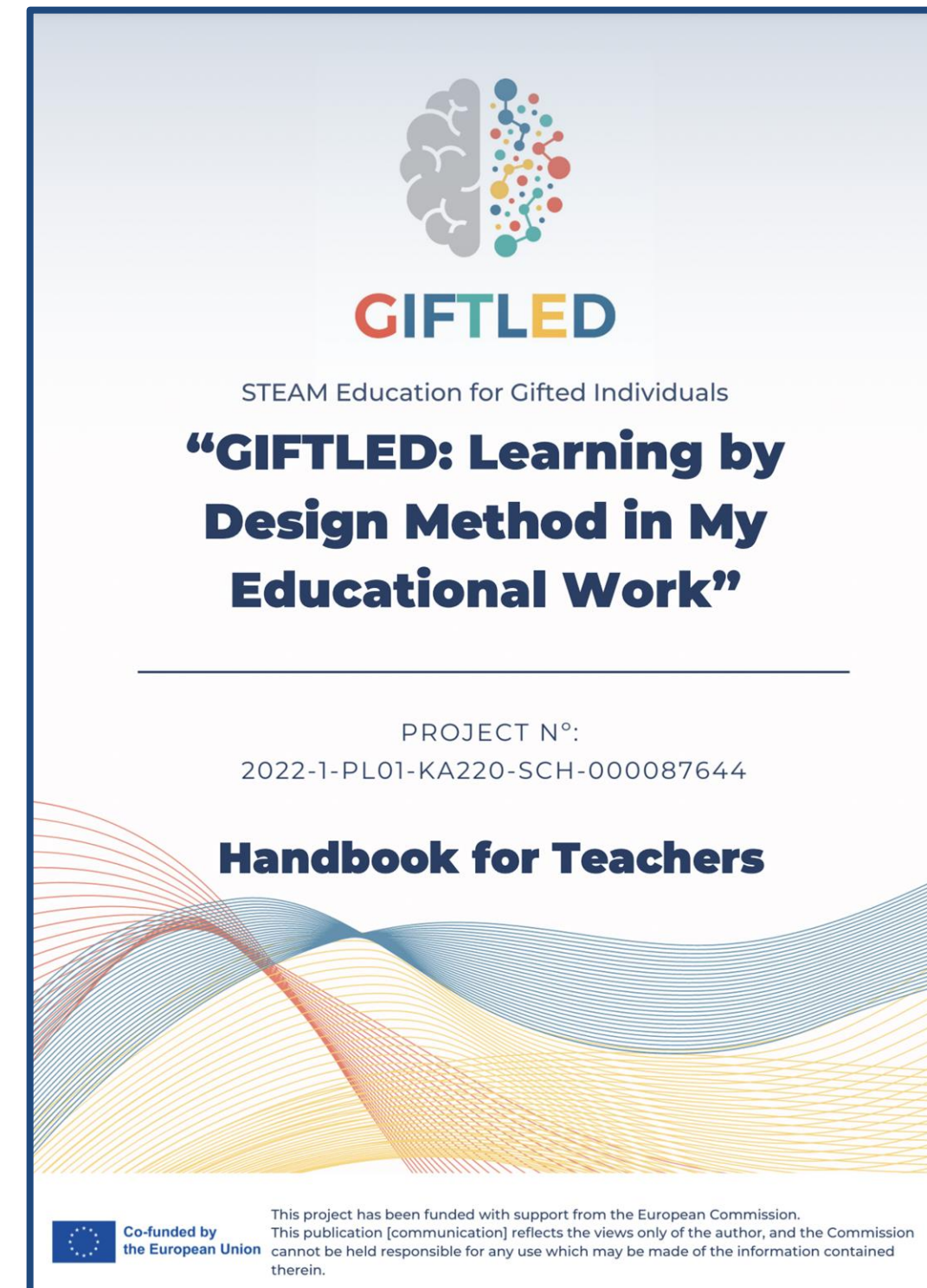
Augmented Reality (AR) and GIFTLED project

Augmented Reality (AR) is revolutionizing STEAM education by blending the digital and real worlds, offering immersive learning experiences. With AR, students can explore complex scientific concepts, conduct virtual experiments, and express creativity through digital art.

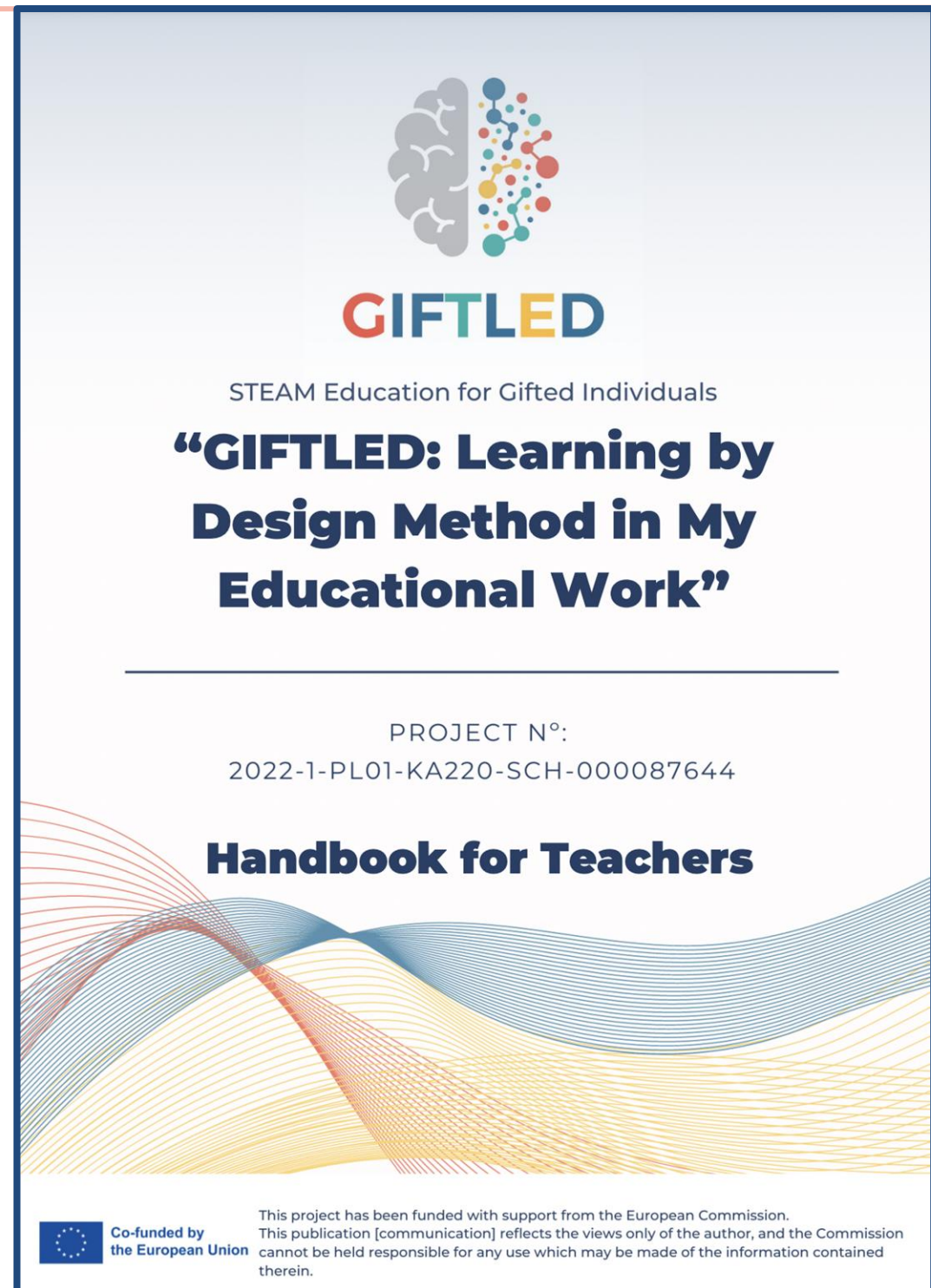
The GIFTLED project is integrating AR into its Learning by Design Approach, with tailored AR Case Studies designed to engage and empower gifted learners. These studies aim to spark curiosity, encourage innovation, and nurture students' talents.

HANDBOOK: “Learning by Design Method in My Educational Work.”

This handbook covers seven chapters, including topics such as Gifted Individuals & their Learning Characteristics, Teaching Strategies for Gifted learners, STEAM education, and Augmented Reality in learning. It serves as an invaluable resource for teachers aiming to empower gifted students in STEAM classrooms. The handbook offers insights into the GIFTLED Method and curriculum, making it an essential guide for educators.



HANDBOOK: “Learning by Design Method in My Educational Work.”



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Augmented Reality (AR) cases

The GIFTLED Project has created **7 Augmented Reality (AR) Case Scenarios**, each tailored to a specific STEAM field.

Gifted students will immerse themselves in authentic learning settings, actively engaging with and designing innovative digital learning products.

The diverse topics covered in AR cases include:

1. Electrical Circuits in Physics
2. AR Math Adventure: Exploring Geometric Shapes and Measurement
3. From Caves to Modernity
4. Three-dimensional Geometry
5. Understanding Wind Turbines
6. Earthquake Resistant Buildings
7. Virtual Art Exhibition Event



EN1 - Physics.pdf



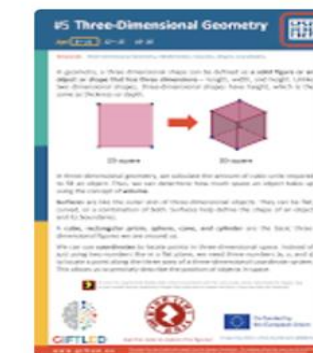
EN2 - Caves.pdf



EN3 - Wind Turbine...



EN4 - Earthquake.pdf



EN5 - Geometry.pdf



EN6 - Mathematics.pdf



EN7 - Art.pdf

Example AR: Mathematical exploration: Exploring geometric shapes and measurements in the context of the GIFTLED project

#6 AR Math Adventure: Exploring Geometric Shapes and Measurement

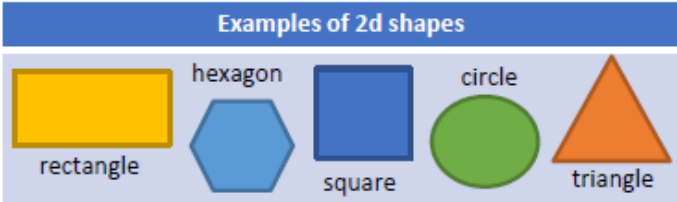
Age: 8-11 12-15 16-18

Keywords: mathematics, geometric shapes, properties, measurement

Geometric shapes are the figures which demonstrate the shape of the objects we see in our everyday life with surfaces, angles, and boundary lines. There are different types of 2D and 3D geometric shapes.

Examples of two-dimensional geometric shapes are appeared below:

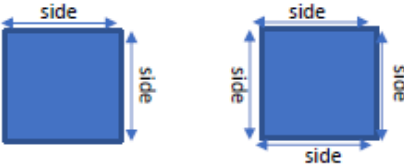
Examples of 2d shapes



Area and perimeter are two different measures used for measuring 2D (or flat) shapes that have only breadth and width.


- Area refers to the space inside the boundary. It is measured in square units like cm^2 , m^2 , etc.
- Perimeter represents the distance around the boundary of a shape. It is measured in units such as cm, m, etc.

In the case of a square shape, the area is equal to $(\text{side}) \times (\text{side})$ square units and the perimeter is the total length of its boundary $(\text{side} + \text{side} + \text{side} + \text{side})$ or $4 \times \text{side}$.



To view the Augmented Reality (AR) content associated with this case-study, please download the Zappar app on your mobile device (AppStore/ Google Play) and point it toward this flyer. Enjoy and have fun learning!

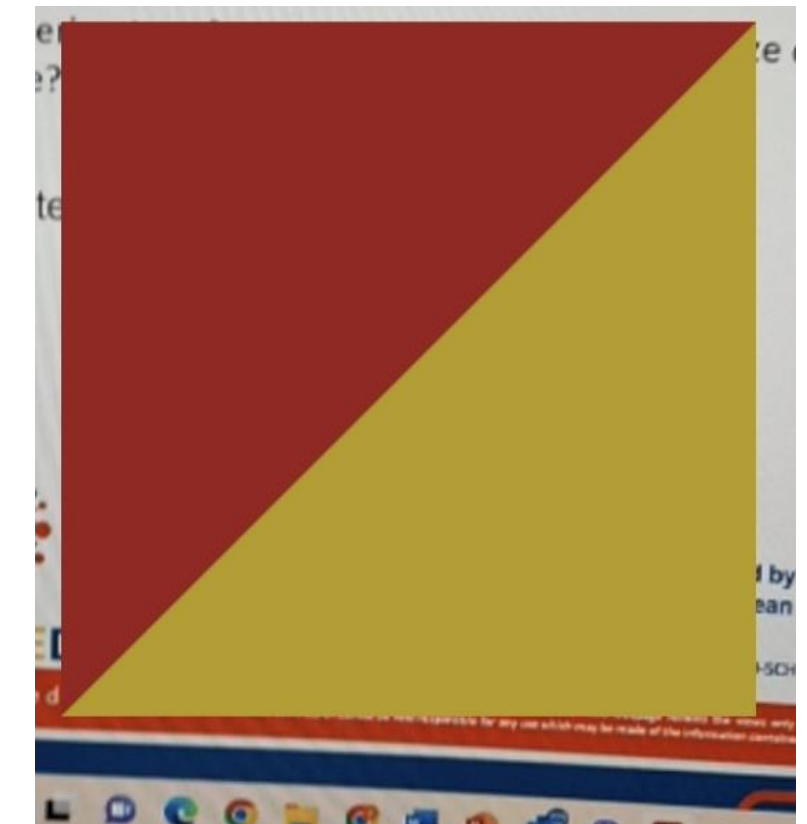
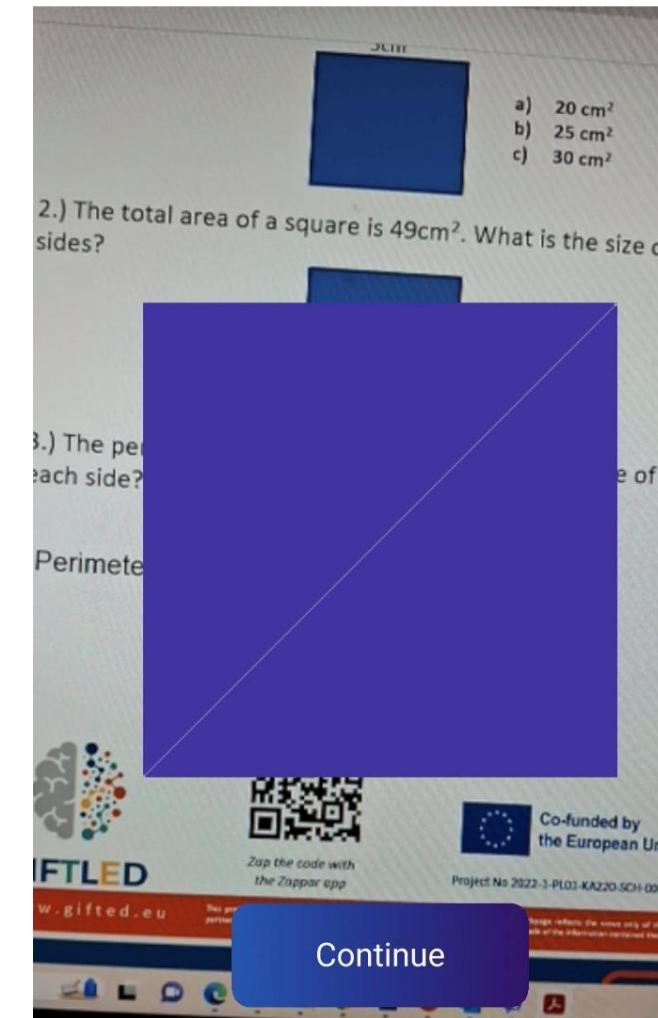
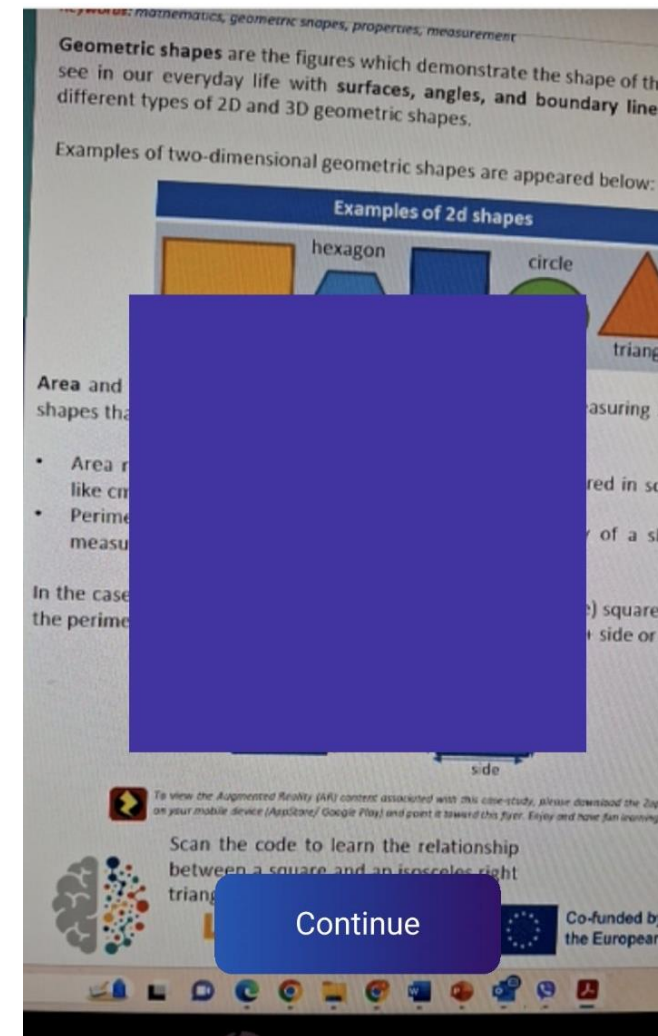
Scan the code to learn the relationship between a square and an isosceles right triangle.



Tap the code with the Zappar app

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Example AR: Mathematical exploration: Exploring geometric shapes and measurements in the context of the GIFTLED project

#6 Test your knowledge

Take the AR-based Quiz below to test your knowledge of the square measurements.

1.) What is the area of the square?

5cm

a) 20 cm²
b) 25 cm²
c) 30 cm²

2.) The total area of a square is 49cm². What is the size of its sides?

49cm²

a) 7 cm
b) 8 cm
c) 9 cm

3.) The perimeter of a square is 124m. What is the size of each side?

Perimeter= 124m

a) 31 m
b) 43 m
c) 62 m

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www.gifted.eu

#6 1.) What is the area of the square?

Age: 8-11 12-15 16-18

Keywords: mathematics, geometric shapes, measurement

5cm

Geometric shapes are the shape of the objects we see in our everyday life. They have boundary lines. There are different types of shapes.

Examples of two shapes are shown below:

Area and perimeter are two different measures used for measuring 2D (or flat) shapes that have boundary lines.

- Area refers to the amount of space covered by a shape. It is measured in square units like cm², m², etc.
- Perimeter represents the length of the boundary of a shape. It is measured in units such as cm, m, etc.

In the case of a square, the area is side × side (side²) and the perimeter is 4 × side.

20 cm²

25 cm²

30 cm²

Correct!

Next

Example AR: Electrical Circuits in Physics

#1 Electrical Circuits in Physics

Age: 8-11 12-15 16-18

Keywords: Electrical Circuits, Physics, Resistance, Current, Voltage.

Electrical circuits are fundamental concepts with many applications in everyday life. Resistors are one of the most common electronic components, and they can be connected in **series** or **parallel** in an electric circuit.

Series

In a series circuit, electricity cannot flow to the next bulb if it burns out. No bulb would work due to the broken circuit.

Parallel

In a parallel circuit, each component is on a separate loop, so if one breaks, the current can still flow through the other branches.

In a Series Circuit, resistors are connected end-to-end so that the current flows sequentially through each resistor. The series circuit's total resistance is equal to the sum of the resistors' individual resistances. This means that the total resistance of the circuit increases as more resistors are added in series.

In a Parallel Circuit, resistors are connected side-by-side so that current can flow simultaneously through each resistor. The parallel circuit's total resistance is less than the resistance of any individual resistor. This means that the total resistance of the circuit decreases as more resistors are added in parallel.

Parallel Circuits are advantageous when a constant voltage is required, whereas **Series Circuits** are advantageous when a constant current is required.

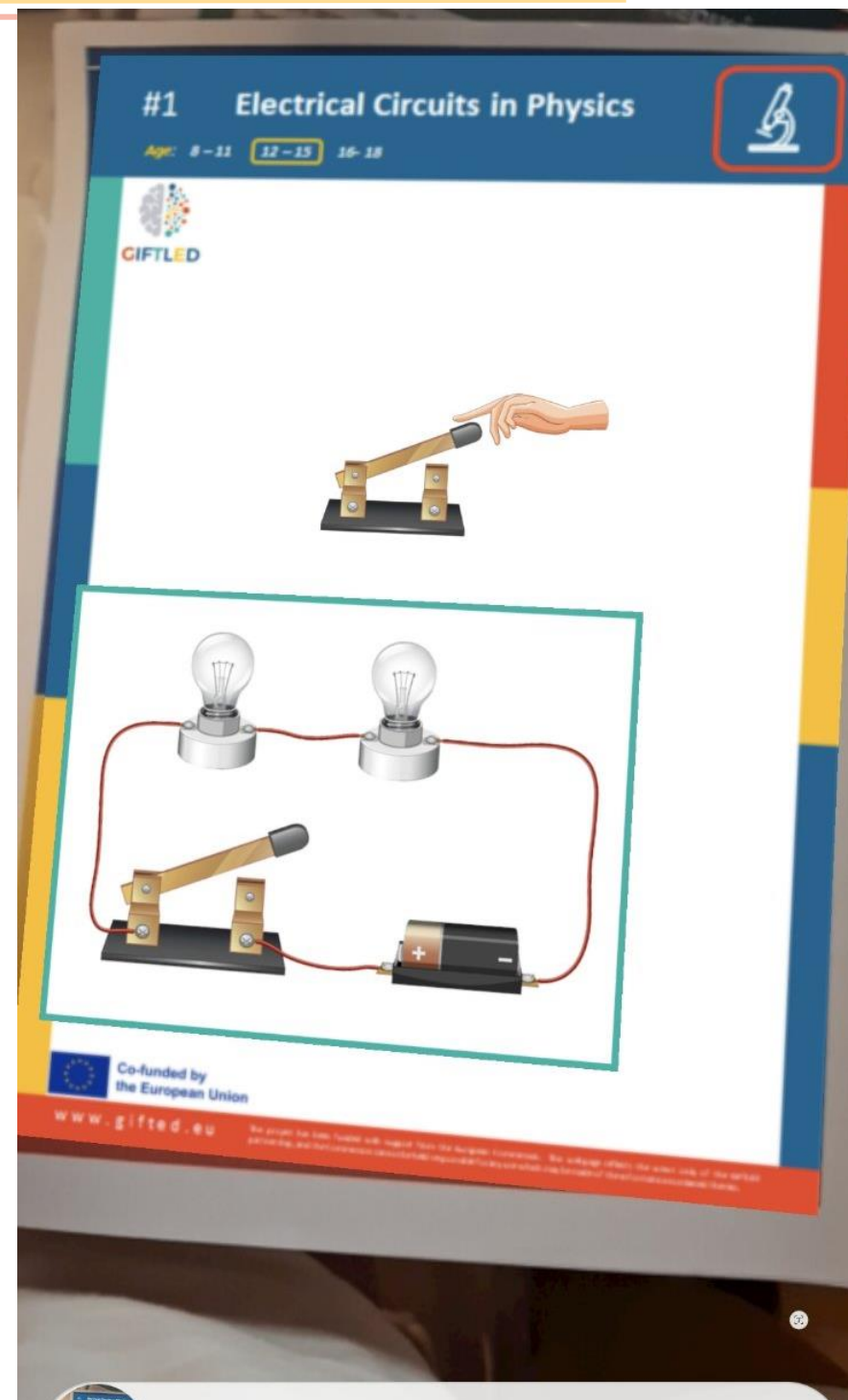
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#1 Test Your Knowledge

Take the AR-based Quiz below to test your knowledge on electrical circuits. Take the AR-based Quiz below to test your knowledge on electrical circuits.

1) Which one is the correct symbol for a resistor in electrical circuits (a) or (b)?

a

b

2) There is something wrong in the following circuit.

True

False

3) The total resistance of the circuit below is 2.5 Ohms.

True

False

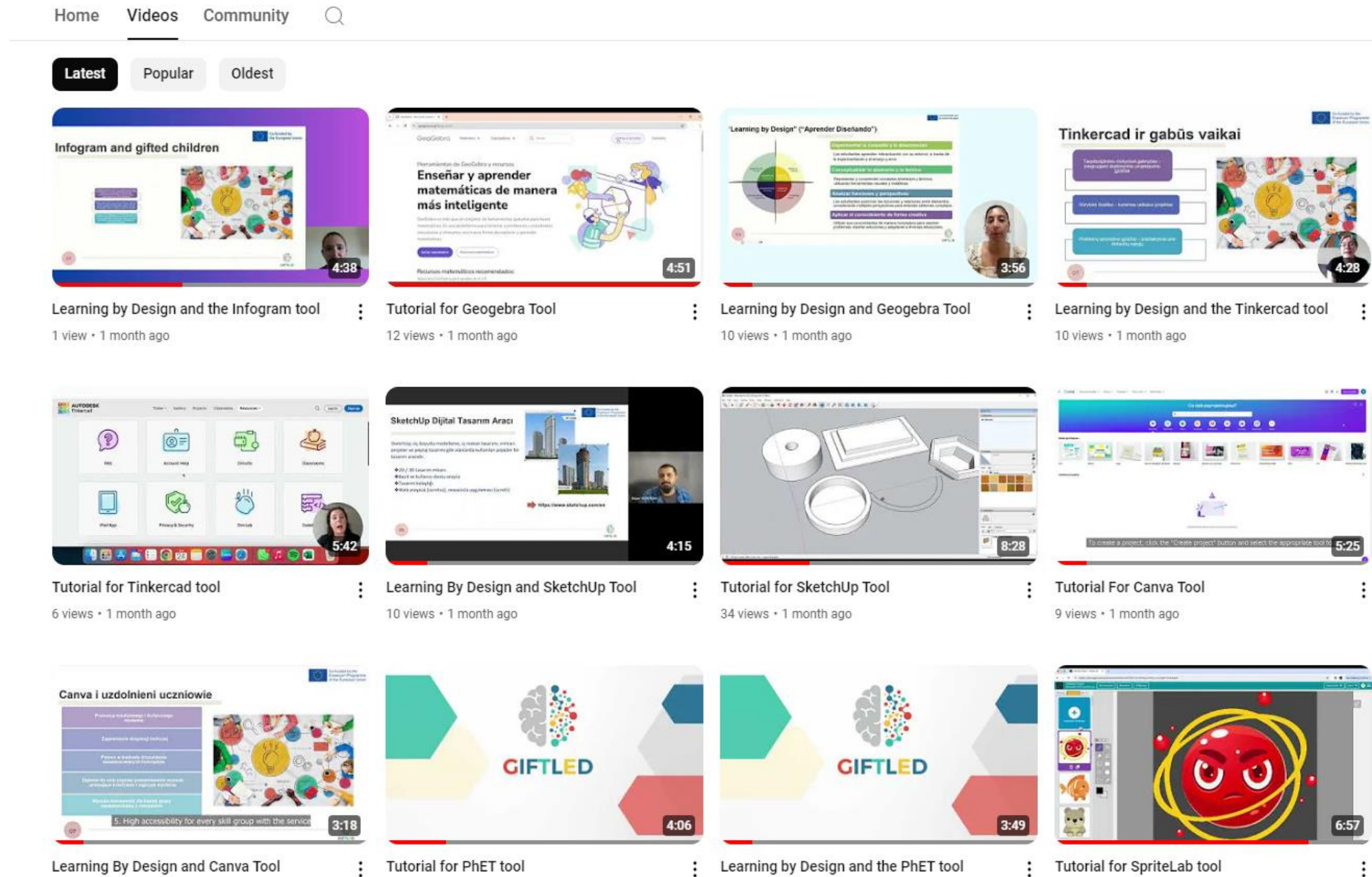
#1 Student challenge

Take on this challenge and build your own electric circuit!

You can start with a simple circuit using a battery, wires,

GIFTLED YouTube Channel

<https://www.youtube.com/channel/UCKYb8fdStzpNLIiQacMS7IQ>



Home Videos Community

Latest Popular Oldest

- Learning by Design and the Infogram tool**
1 view • 1 month ago
- Tutorial for Geogebra Tool**
12 views • 1 month ago
- Learning by Design and Geogebra Tool**
10 views • 1 month ago
- Learning by Design and the Tinkercad tool**
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- Learning By Design and SketchUp Tool**
10 views • 1 month ago
- Tutorial for SketchUp Tool**
34 views • 1 month ago
- Tutorial For Canva Tool**
9 views • 1 month ago
- Learning By Design and Canva Tool**
5. High accessibility for every skill group with the service
- Tutorial for PhET tool**
- Learning by Design and the PhET tool**
- Tutorial for SpriteLab tool**

The GIFTLED Curriculum

Focus: Inclusive education for gifted/talented students using the **Learning by Design** approach in STEAM disciplines.

Structure: The curriculum is divided into three main parts:

- 1.Content:** Objectives and topics from 7 STEAM disciplines.
- 2.Process:** Educational methods utilizing AR and digital tools.
- 3.Product:** Creative outputs by students to demonstrate their learning.

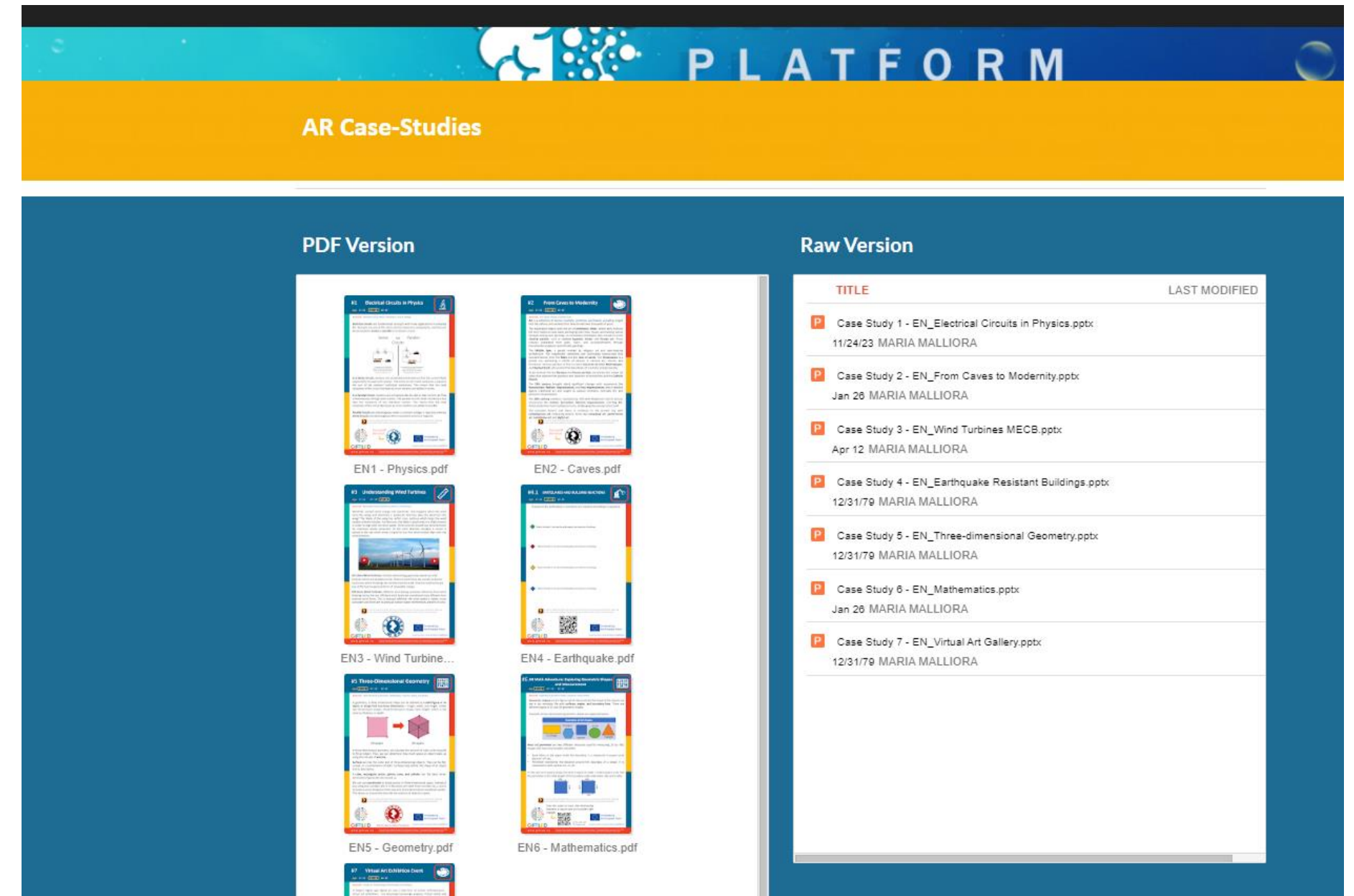
Development Tools: Includes AR case studies and Toolkit Introduction Videos (TIVs) for practical demonstrations.

The GIFTLED Platform

Access to customizable STEAM resources.

Adapting materials for different learning needs.

Easy integration of resources into classroom practice.



The screenshot displays the 'AR Case-Studies' section of the GIFTLED Platform. It features a header with the platform logo and the text 'AR Case-Studies'. Below this, there are two main columns: 'PDF Version' and 'Raw Version'. The 'PDF Version' column shows a grid of six PDF thumbnails, each with a title and a small image. The 'Raw Version' column shows a table with two columns: 'TITLE' and 'LAST MODIFIED'. The table lists seven case studies with their respective titles and modification dates.

TITLE	LAST MODIFIED
Case Study 1 - EN_Electrical Circuits in Physics.pptx	11/24/23 MARIA MALLIORA
Case Study 2 - EN_From Caves to Modernity.pptx	Jan 26 MARIA MALLIORA
Case Study 3 - EN_Wind Turbines MECB.pptx	Apr 12 MARIA MALLIORA
Case Study 4 - EN_Earthquake Resistant Buildings.pptx	12/31/79 MARIA MALLIORA
Case Study 5 - EN_Three-dimensional Geometry.pptx	12/31/79 MARIA MALLIORA
Case Study 6 - EN_Mathematics.pptx	Jan 26 MARIA MALLIORA
Case Study 7 - EN_Virtual Art Gallery.pptx	12/31/79 MARIA MALLIORA

Augmented Reality Application: Zappar



<https://zap.works/>



**Activity 1 -
Online Game**

START 1	2	3	4	5
6	7	8	9	10
11	12	13	14	15
16	17	18	19	FINISH 20

Activity 1 - Online Game

Instructions:

1. [Roll dice](#)
2. Download and open the Zappar app.
3. Answer the questions/tasks/problem solving scenarios.
4. Move to the next player after your turn.
5. Reach the Final Square by rolling the exact number needed.



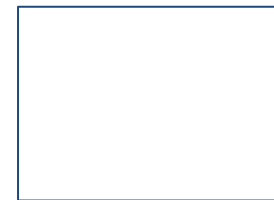
Knowledge-Based Questions



Hands-On Questions/Tasks



Problem-Solving/Scenario-Based Questions



None



Knowledge-Based Questions

Activity 1 - Online Game

5. Which of the following is a key principle of the 'Learning by Design' approach?

- A) Passive learning
- B) Transforming knowledge into creative products ←
- C) Memorizing facts
- D) Avoiding technology



Knowledge-Based Questions

Activity 1 - Online Game

7. What is one of the main benefits of using AR in education?

- A) It makes learning more interactive ←
- B) It reduces the need for hands-on activities
- C) It distracts students from their tasks



Knowledge-Based Questions

Activity 1 - Online Game

17. Which cognitive skill is most actively developed when students use AR as part of the 'Learning by Design' approach?

- A) Rote memorization
- B) Critical thinking and problem-solving
- C) Repetition of learned material
- D) Note-taking and summarization





Knowledge-Based Questions

Activity 1 - Online Game

11. Augmented Reality (AR) can only be used in the classroom for science-related subjects. True or False

False



Knowledge-Based Questions

Activity 1 - Online Game

19. Which principle of AR most aligns with the 'Learning by Design' approach in fostering higher-order thinking skills in gifted students?


- A) AR's ability to create 3D simulations of historical events
- B) AR's capacity to deliver large amounts of information quickly
- C) AR's use of multimedia elements for passive observation
- D) AR's support for interactive, real-world problem-solving activities ←



Hands-On Questions/Tasks

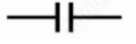
Activity 1 - Online Game

3.

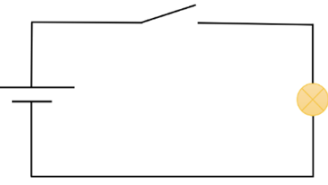
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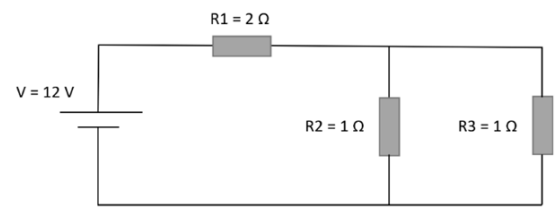
1) Is the following the correct symbol for a resistor in electrical circuits?






2) When an electrical circuit's switch is in the open position, no current flows through the circuit. Therefore, the bulb in the following circuit should be off.



3) The total resistance of the circuit below is 2.5 Ohms.




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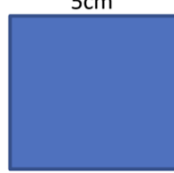
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6.

#6 Test your knowledge 


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1.) What is the area of the square?



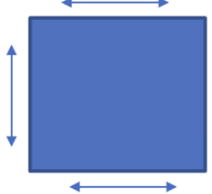
a) 20 cm²
b) 25 cm²
c) 30 cm²

2.) The total area of a square is 49cm². What is the size of its sides?






a) 7 cm
b) 8 cm
c) 9 cm

3.) The perimeter of a square is 124m. What is the size of each side?



Perimeter= 124m

a) 31 m
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Hands-On Questions/Tasks


Activity 1 - Online Game

9.




#2 Test Your Knowledge 

Take the AR-based Quiz below to test your knowledge on the evolution of art.

- 1) What is the significance of cave paintings in prehistoric times? Did they serve as early forms of communication?
- 2) How did the invention of photography influence the development of art? Did it let to the decline of traditional painting?
- 3) What era does the painting below represent? Is it Surrealism?



The Persistence of Memory - Salvador Dalí






Project No 2022-1-PL01-KA220-SCH-000087644

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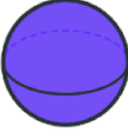


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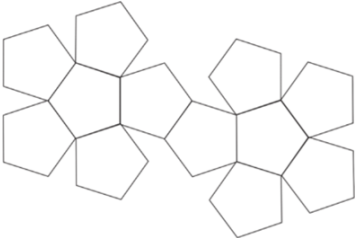
#5 Test Your Knowledge 

Take the AR-based Quiz below to test your knowledge on three-dimensional geometry.

- 1) Which of the following 3D figures is a cylinder?

- 2) Here is the net of a 3D shape. Can you identify which shape it will form when folded?






Tetrahedron
Cube
Octahedron
Dodecahedron

- 3) Solve this riddle: "My faces are all the same, curved and smooth, I have no vertices or edges, just surfaces that move. Who am I?"

Triangle Cylinder

Sphere

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Activity 1 - Online Game



Problem-Solving/Scenario-Based Questions

4. Scenario: In a lesson about the solar system, how could AR be used to help students explore planets and their orbits around the sun?

Answer: AR could display a model of the solar system in 3D, with planets orbiting the sun in real time. Students could zoom in on individual planets to learn more about their characteristics.

Activity 1 - Online Game

Problem-Solving/Scenario-Based Questions

14. Scenario: A gifted student is struggling to stay engaged with traditional textbook-based learning in a science class. How might you use augmented reality to capture their attention and help them better understand the subject matter?

Answer: Use augmented reality to bring the subject to life, such as projecting interactive 3D models (e.g., planets or cells) that the student can explore and manipulate. This makes learning more engaging and visually stimulating.



Problem-Solving/Scenario-Based Questions

Activity 1 - Online Game

18. Scenario: You're teaching students about landmarks around the world. How could AR help them see famous places like the Eiffel Tower without leaving the classroom?

Answer: AR can project 3D models of landmarks into the classroom space, allowing students to virtually explore places like the Eiffel Tower by walking around the model and observing details.

Evaluation Form

Please complete the evaluation form to evaluate:

1. The tools of GIFTLED
2. The organizing of the workshop

Google Form link: <https://forms.gle/U21rRDE2rSnddgCP9>



Thank you!



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